FIG. 1 (a)

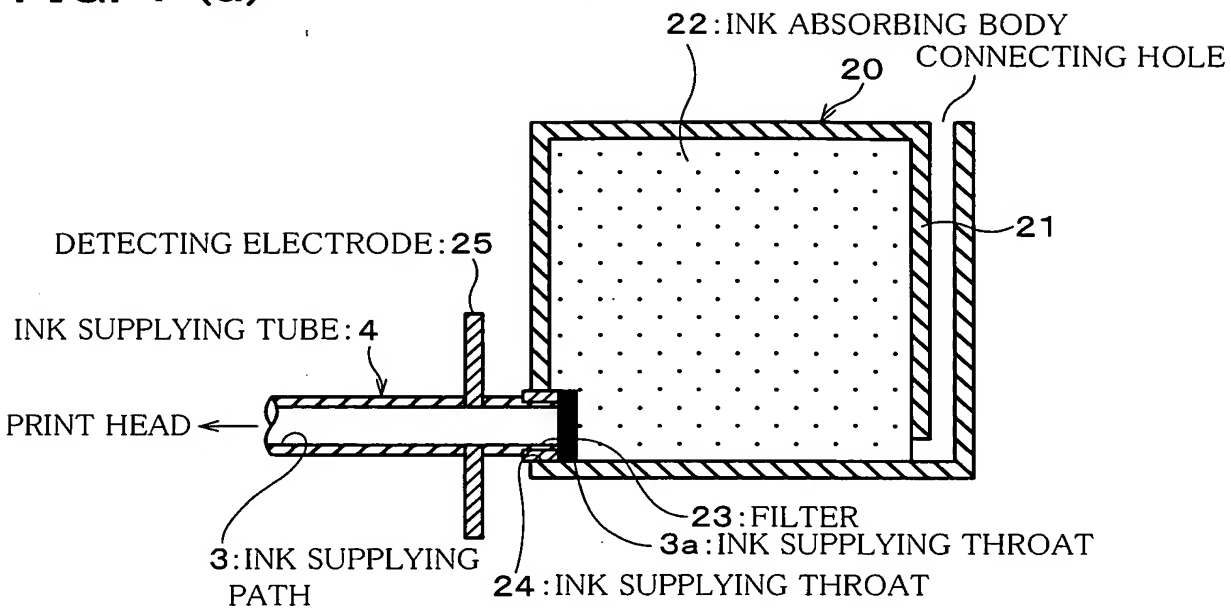


FIG. 1 (b)

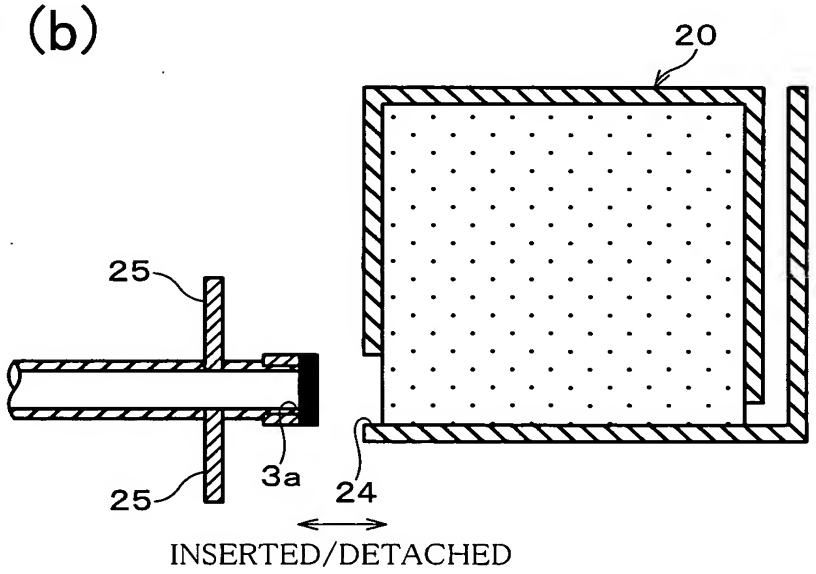


FIG. 1 (c)

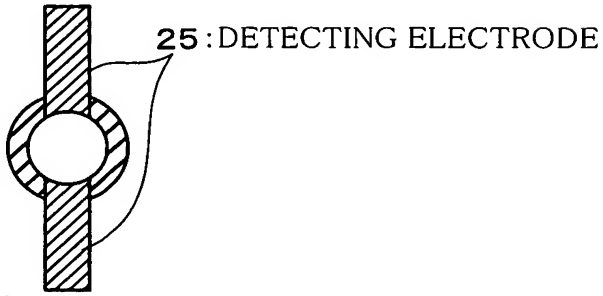


FIG. 2

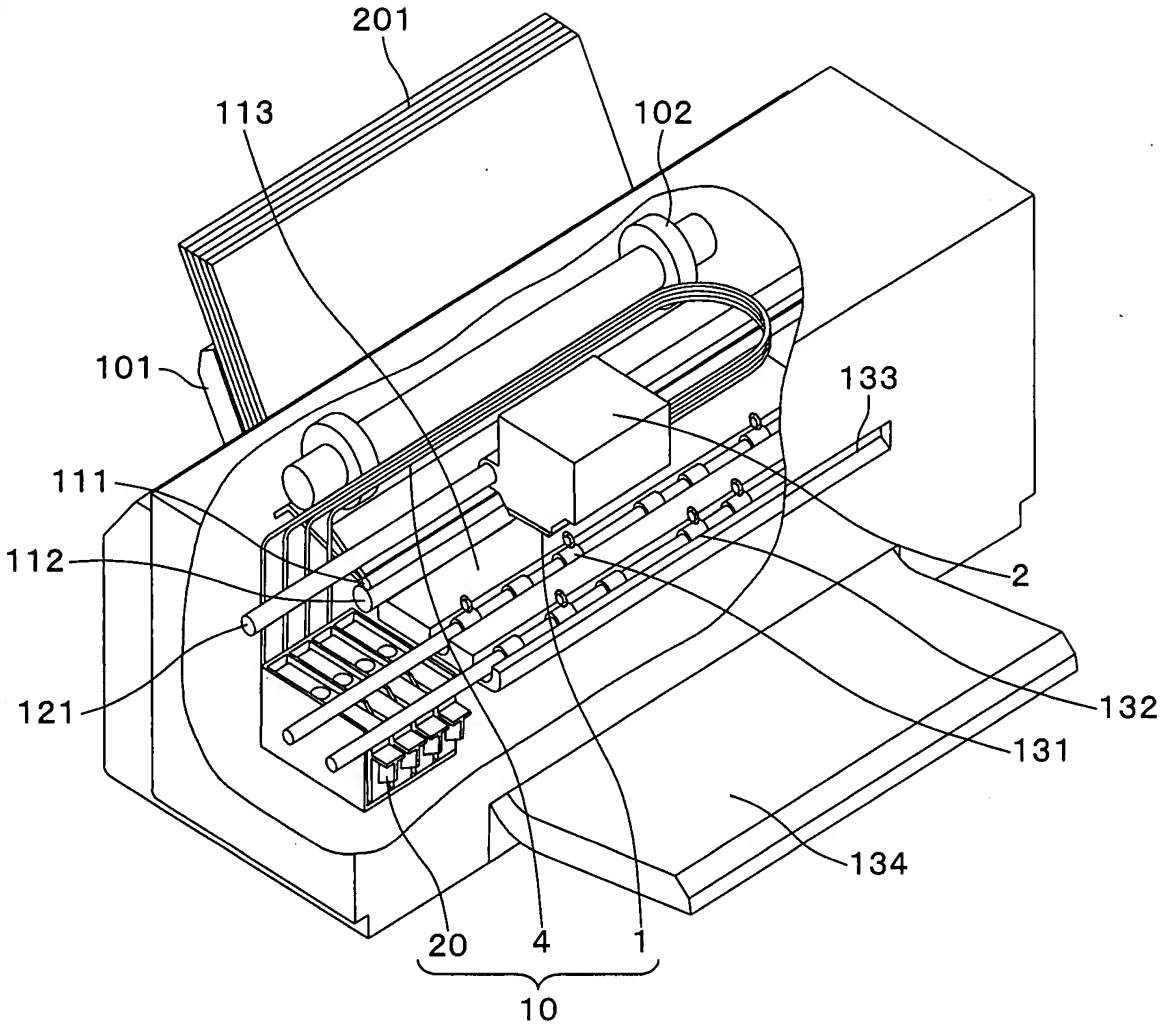


FIG. 3

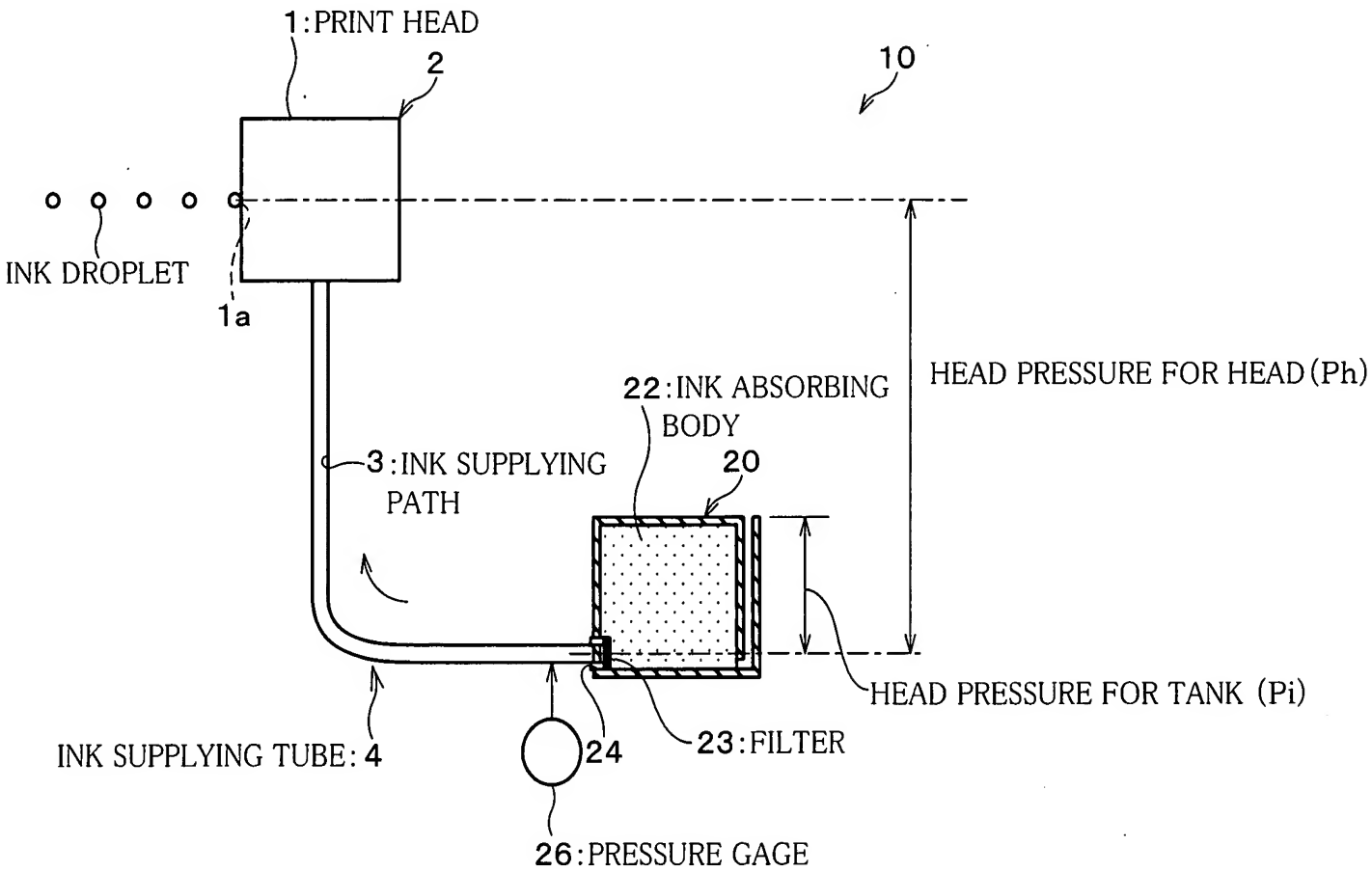

1:PRINT HEAD
2
10
INK DROPLET
1a
HEAD PRESSURE FOR HEAD (Ph)
22:INK ABSORBING BODY
20
3:INK SUPPLYING PATH
HEAD PRESSURE FOR TANK (Pi)
INK SUPPLYING TUBE: 4
24
23:FILTER
26:PRESSURE GAGE

FIG. 4

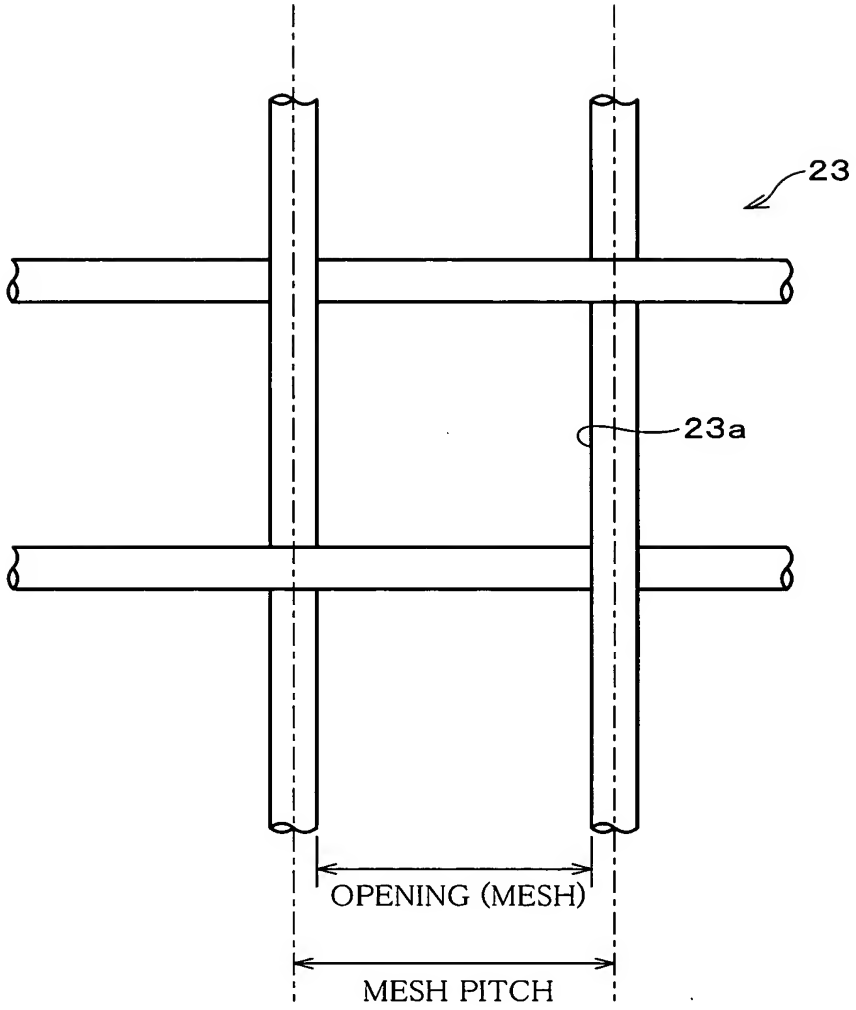


FIG. 5

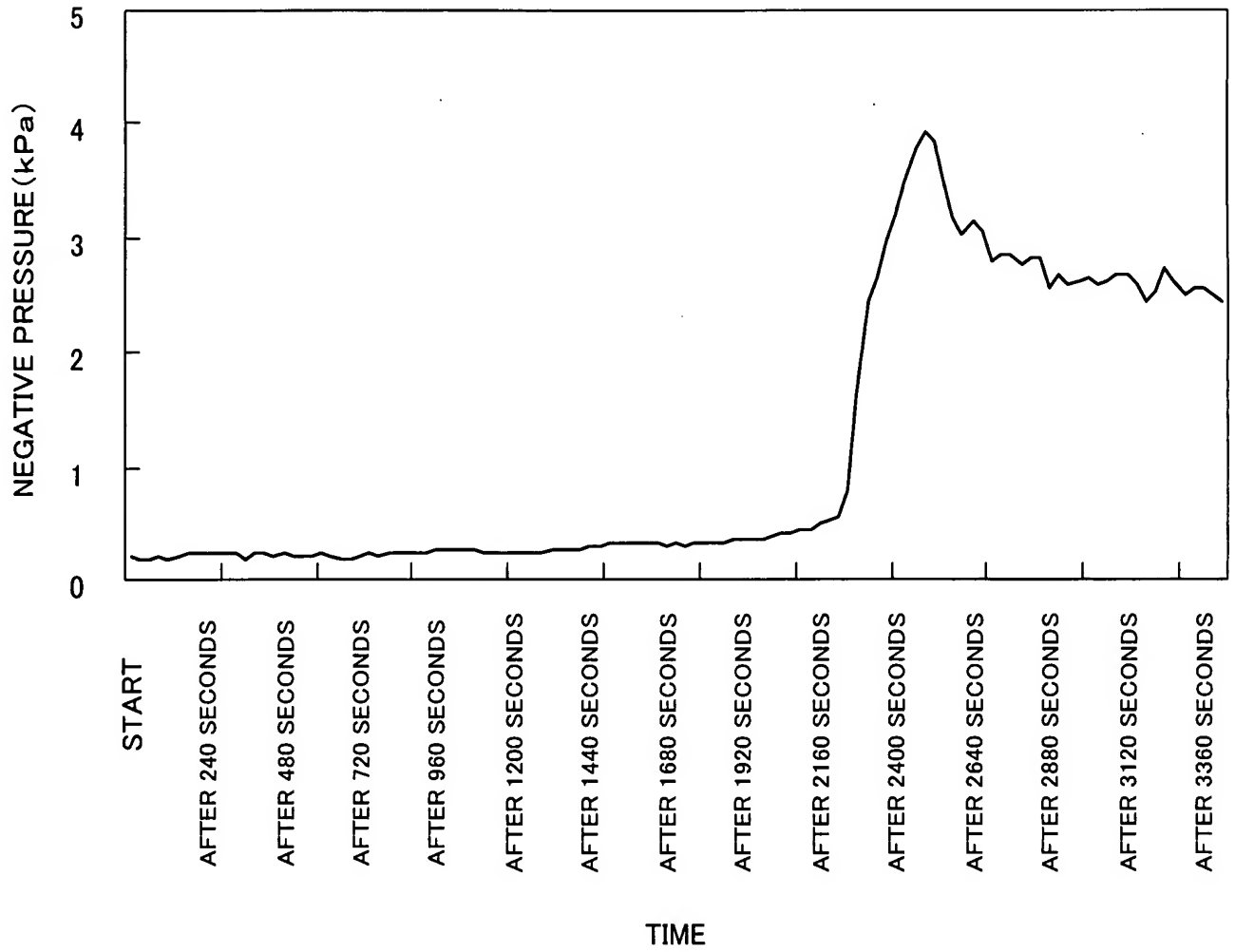
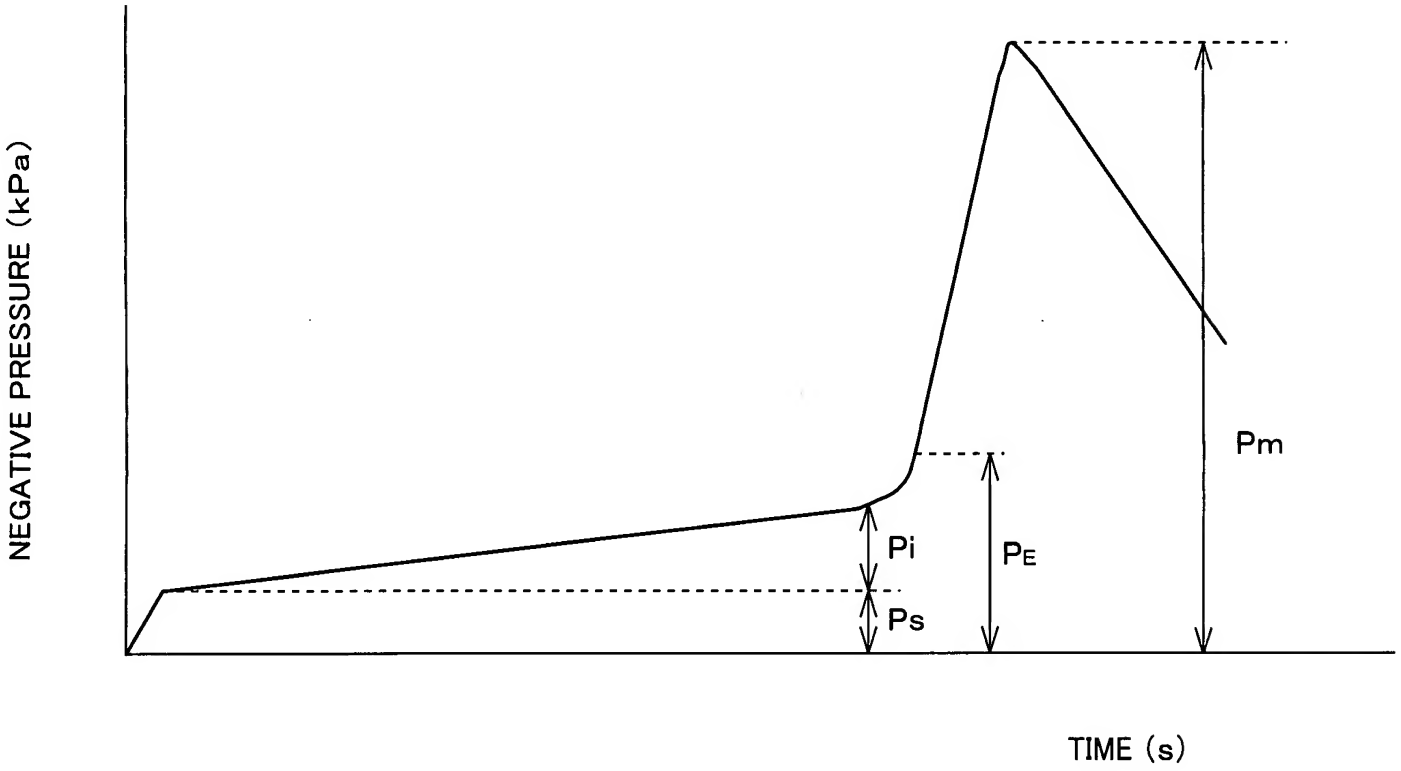

NEGATIVE PRESSURE(kPa)
0
1
2
3
4
5
START
AFTER 240 SECONDS
AFTER 480 SECONDS
AFTER 720 SECONDS
AFTER 960 SECONDS
AFTER 1200 SECONDS
AFTER 1440 SECONDS
AFTER 1680 SECONDS
AFTER 1920 SECONDS
AFTER 2160 SECONDS
AFTER 2400 SECONDS
AFTER 2640 SECONDS
AFTER 2880 SECONDS
AFTER 3120 SECONDS
AFTER 3360 SECONDS
TIME

FIG. 6



Ps: NEGATIVE PRESSURE DUE TO VISCOSITY WHEN THE INK IS FULLY CHARGED

Pi: HEAD PRESSURE OF INK TANK (HEAD PRESSURE OF TANK)

P_E: CRITICAL PRESSURE OF INK ABSORBING BODY WHEN THE INK IS DEPLETED

Pm: CRITICAL PRESSURE OF FILTER

FIG. 7

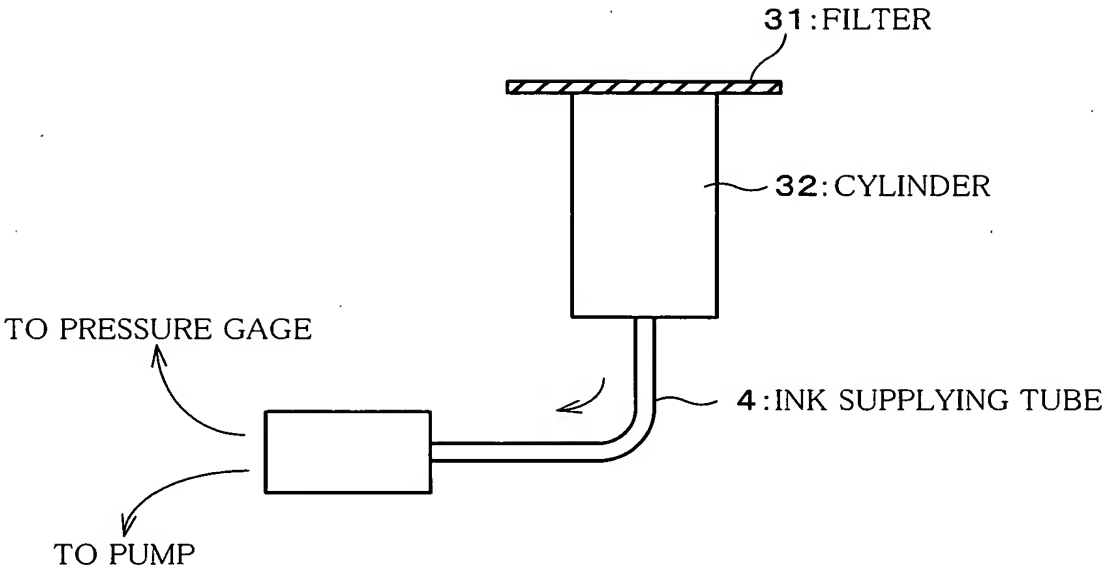

31:FILTER
32:CYLINDER
TO PRESSURE GAGE
4:INK SUPPLYING TUBE
TO PUMP

FIG. 8

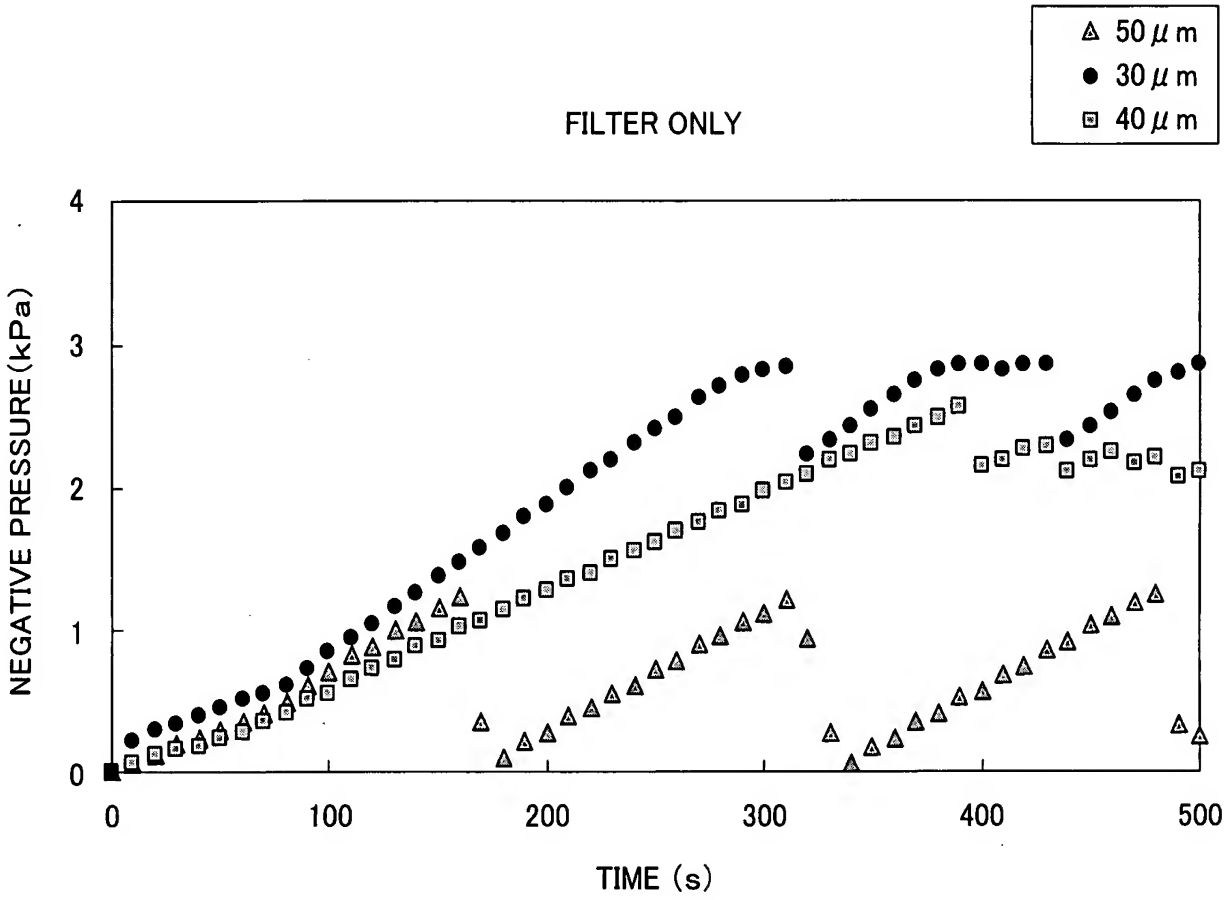

50 μm
30 μm
40 μm
FILTER ONLY
NEGATIVE PRESSURE(kPa)
0
1
2
3
4
0
100
200
300
400
500
TIME (s)

FIG. 9

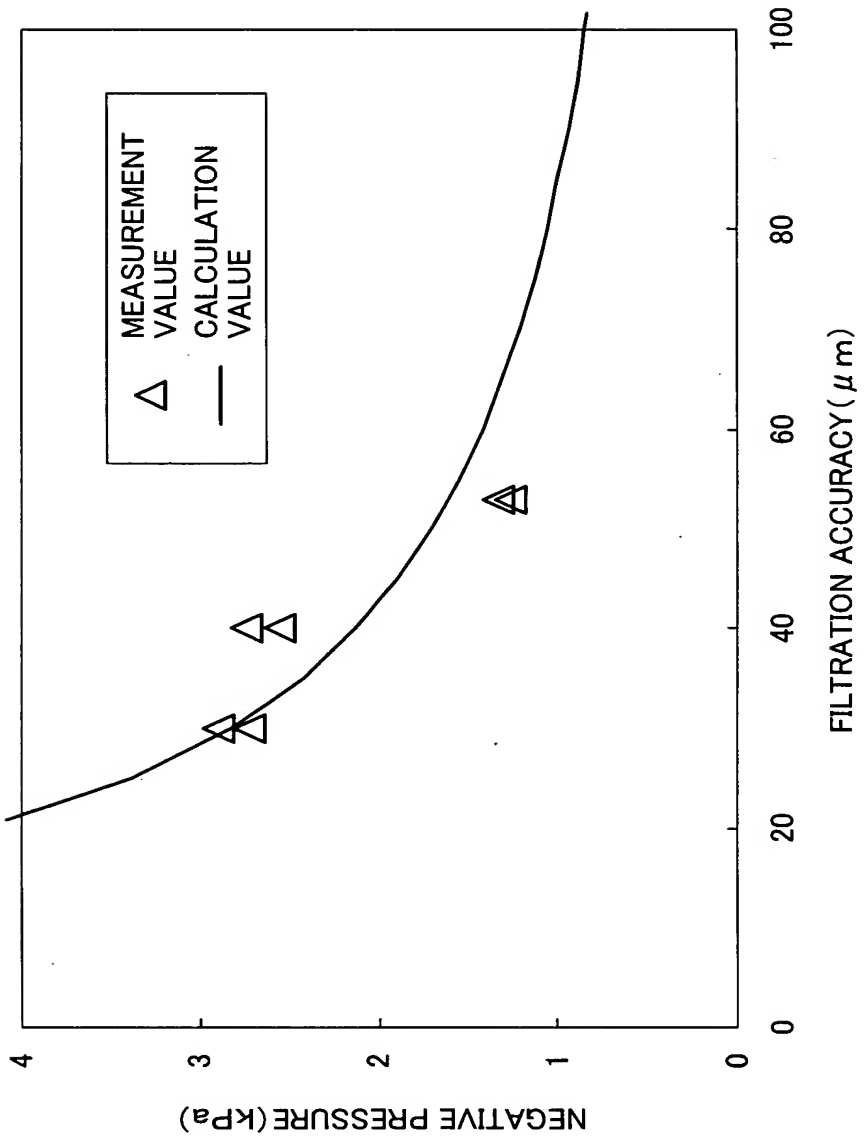

MEASUREMENT VALUE
CALCULATION VALUE
NEGATIVE PRESSURE (kPa)
0
1
2
3
4
0
20
40
60
80
100
FILTRATION ACCURACY (μm)

FIG. 10

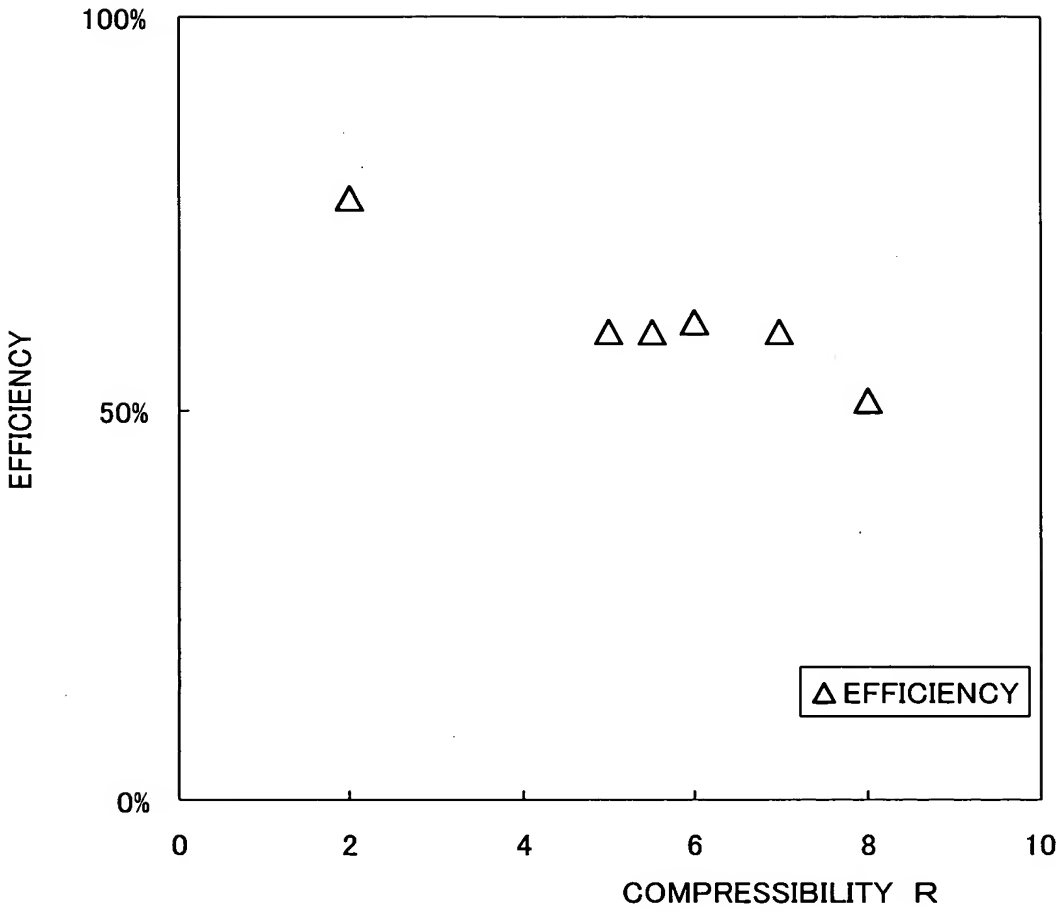


FIG. 11

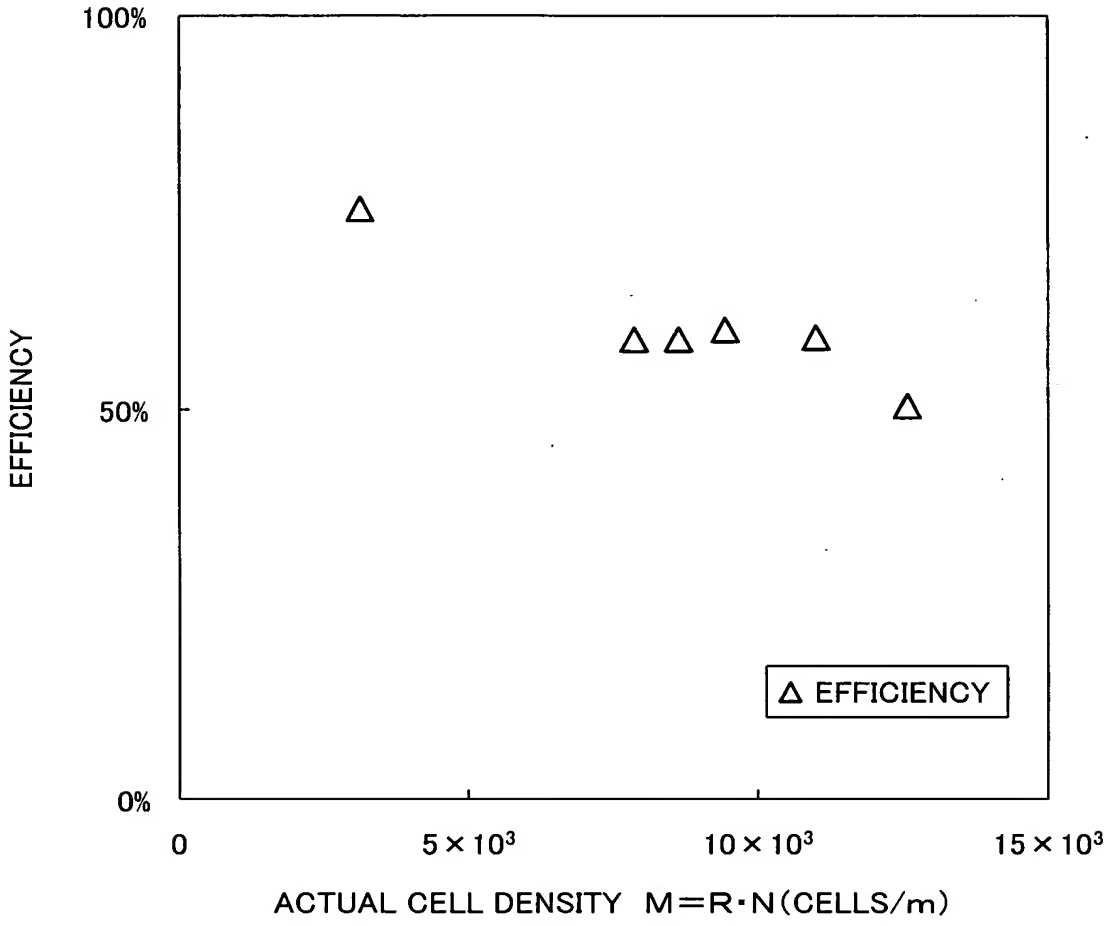

100%
50%
0%
EFFICIENCY
0
5×10³
10×10³
15×10³
ACTUAL CELL DENSITY M=R·N(CELLS/m)
△ EFFICIENCY

FIG. 12

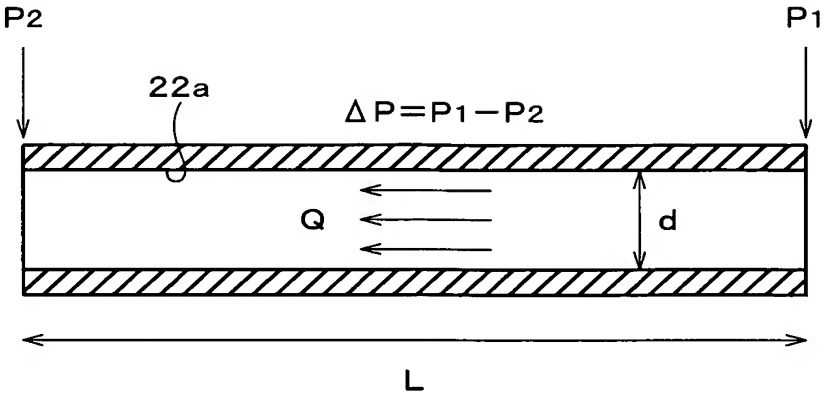


FIG. 13

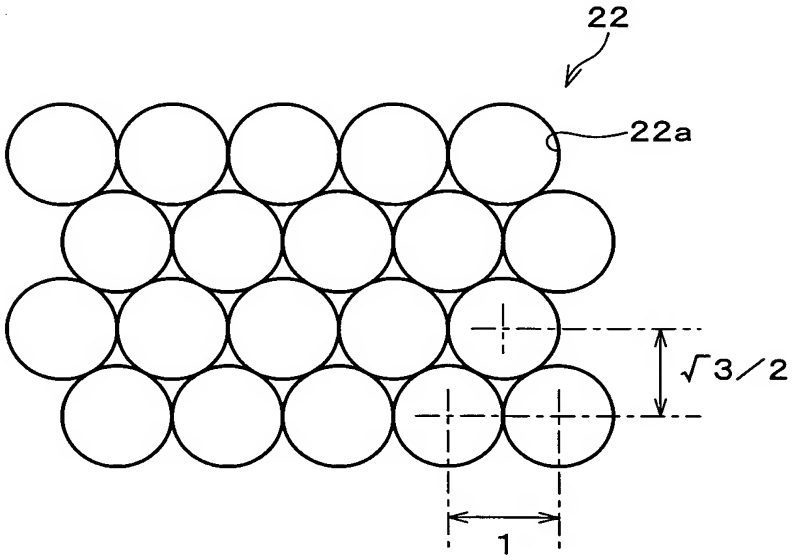


FIG. 14

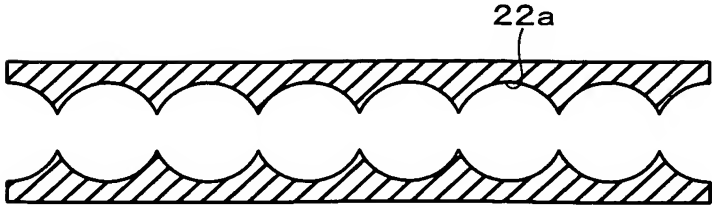
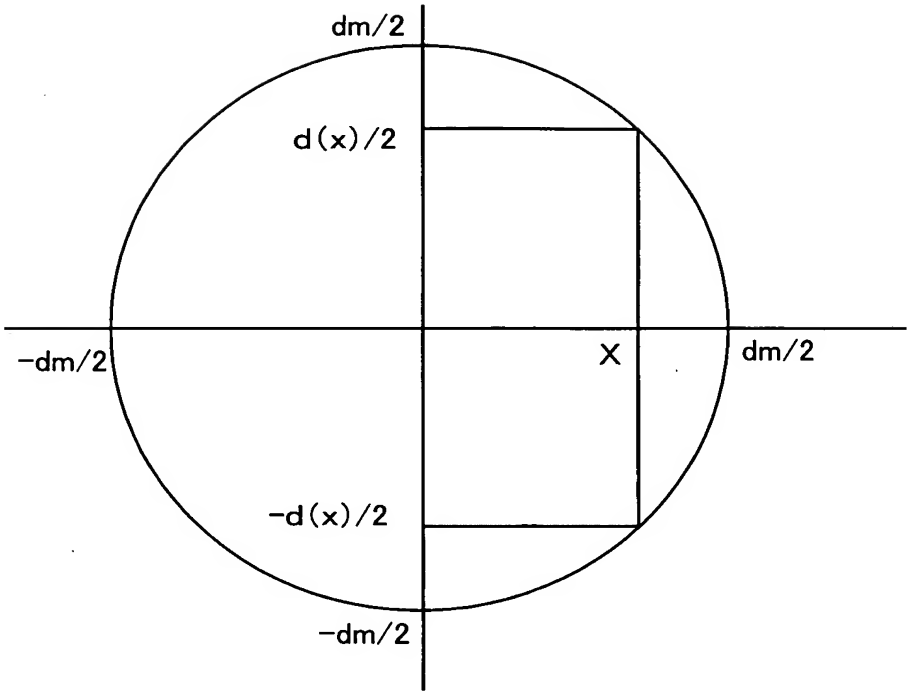


FIG. 15



$$Rd = \int_0^X \frac{1}{\{\ 2\sqrt{(dm/2)^2 - X^2}\ \}^4}\ dX$$

$$Rm = \int_0^X \frac{1}{dm^4}\ dX$$

FIG. 16

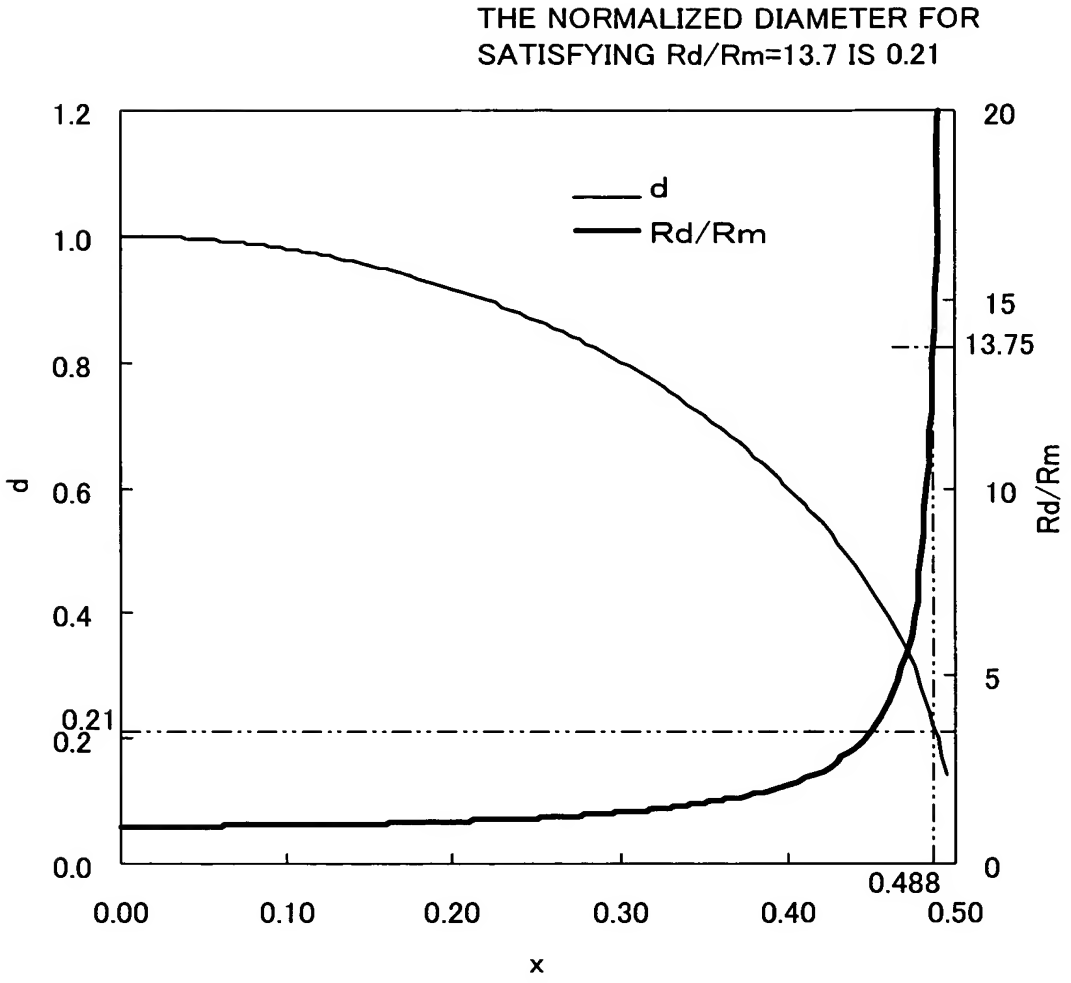

THE NORMALIZED DIAMETER FOR
SATISFYING Rd/Rm=13.7 IS 0.21
d
Rd/Rm
1.2
1.0
0.8
0.6
0.4
0.21
0.2
0.0
d
20
15
13.75
10
5
0
Rd/Rm
0.488
0.00
0.10
0.20
0.30
0.40
0.50
x

FIG. 17

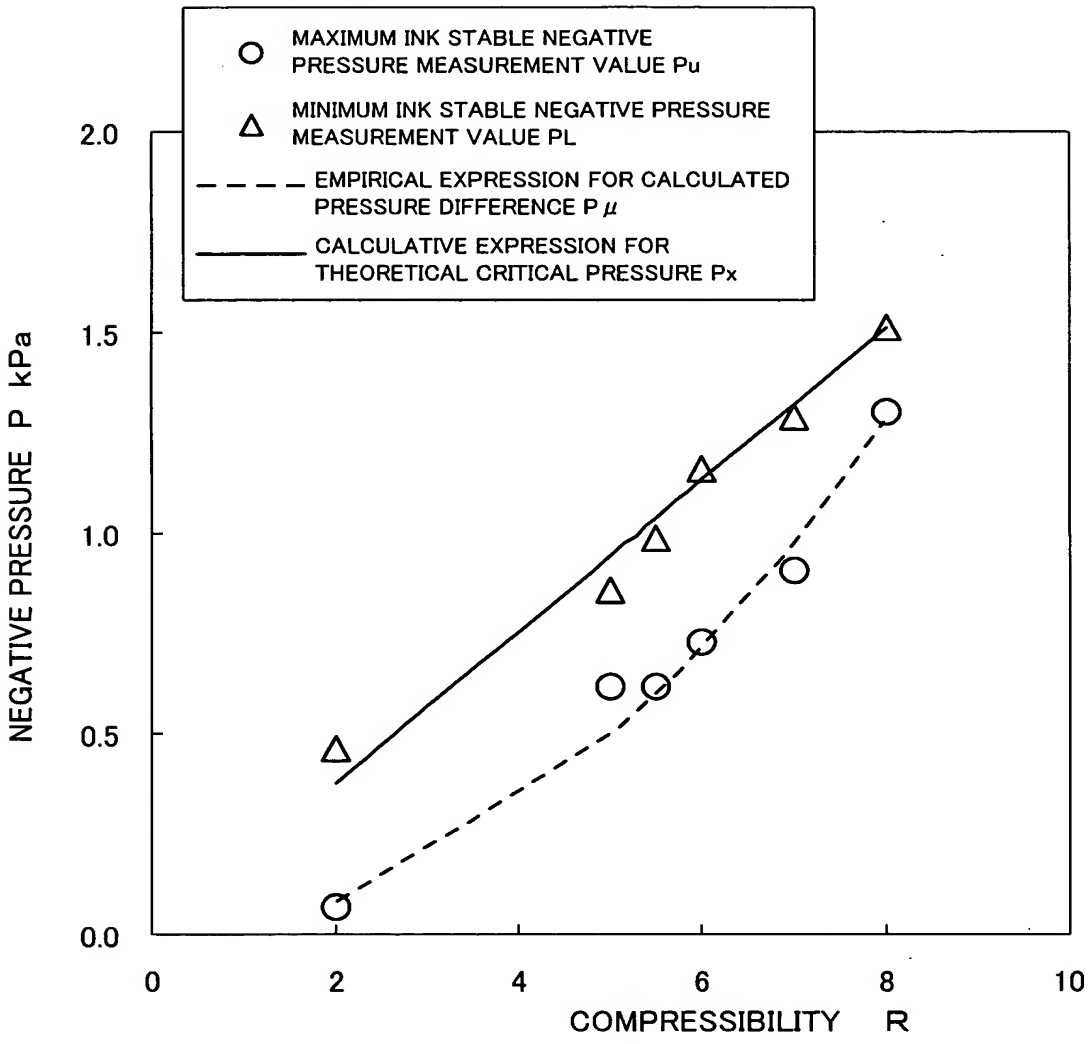
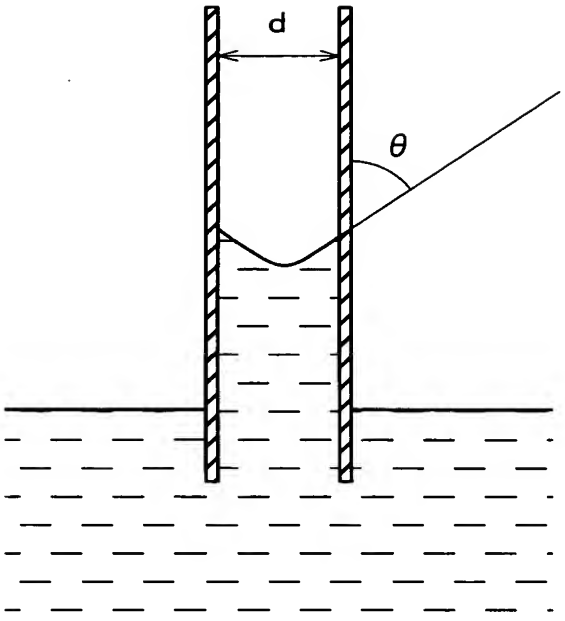
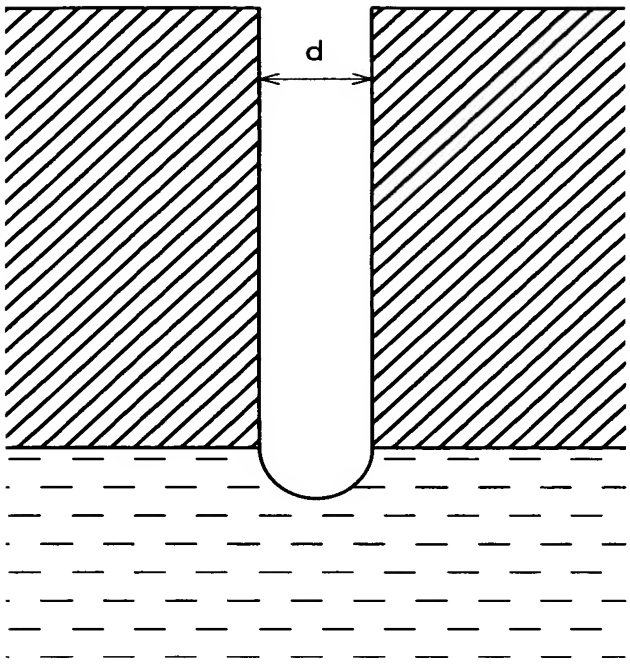

MAXIMUM INK STABLE NEGATIVE PRESSURE MEASUREMENT VALUE Pu
MINIMUM INK STABLE NEGATIVE PRESSURE MEASUREMENT VALUE PL
EMPIRICAL EXPRESSION FOR CALCULATED PRESSURE DIFFERENCE P μ
CALCULATIVE EXPRESSION FOR THEORETICAL CRITICAL PRESSURE Px
NEGATIVE PRESSURE P kPa
2.0
1.5
1.0
0.5
0.0
0
2
4
6
8
10
COMPRESSIBILITY R

FIG. 18



$$Pt = 4\eta\cos\theta / d$$

FIG. 19



$Pt = 4\eta / d$

FIG. 20

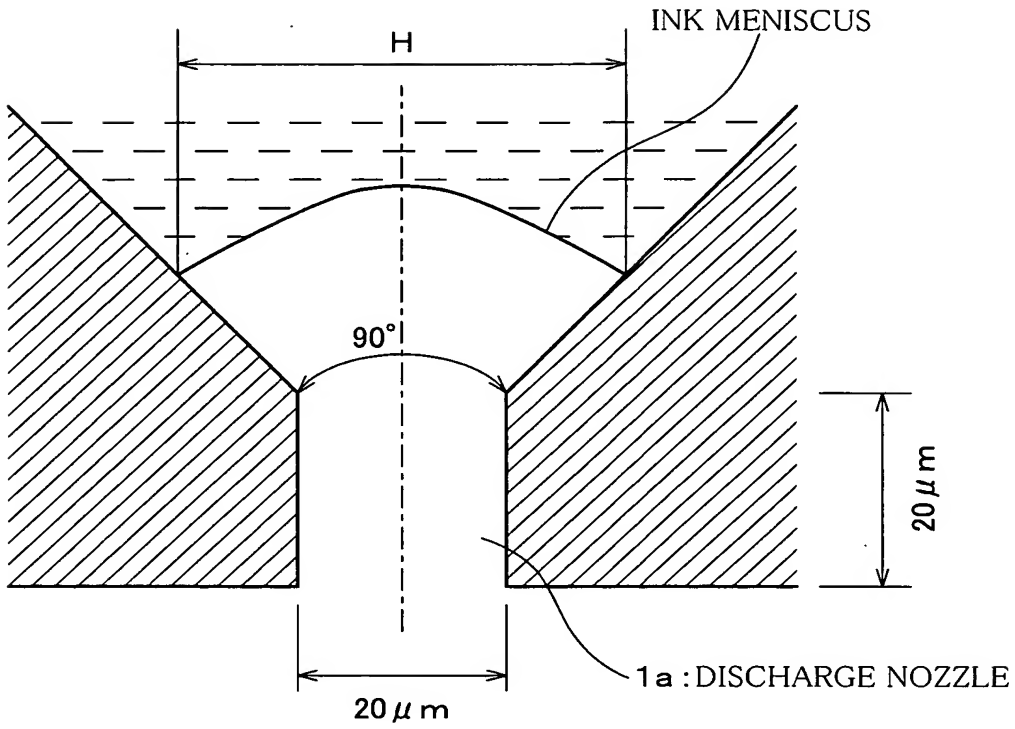


FIG. 21 (a)

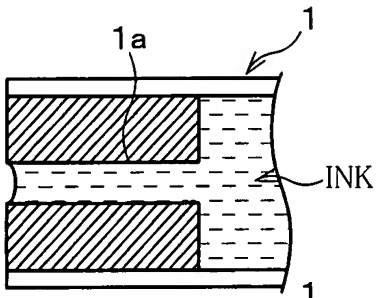


FIG. 21 (b)

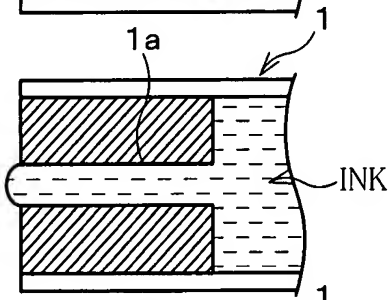


FIG. 21 (c)

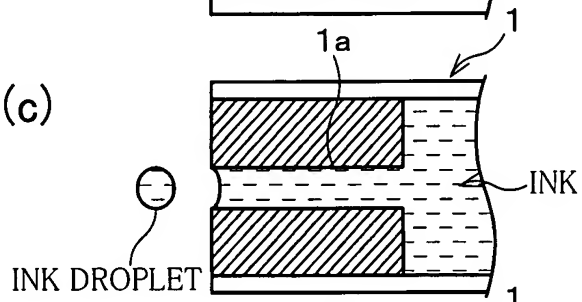


FIG. 21 (d)

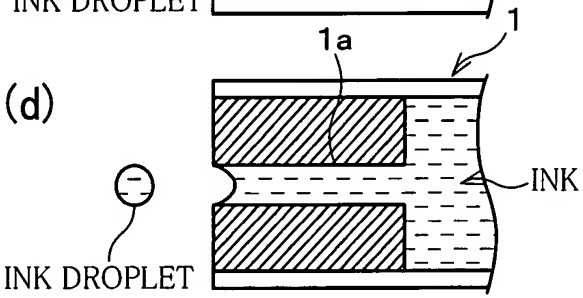


FIG. 21 (e)

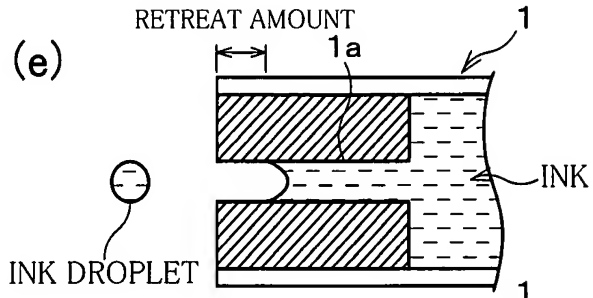


FIG. 21 (f)

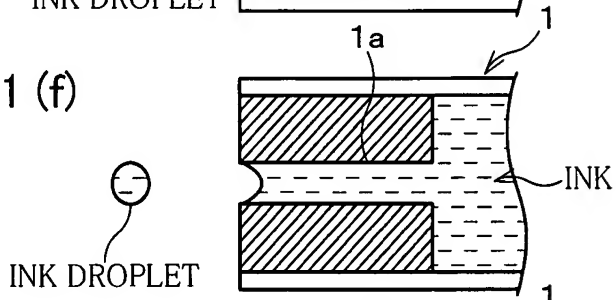


FIG. 21 (g)

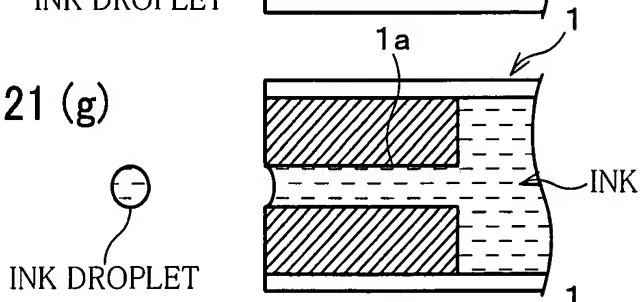


FIG. 21 (h)

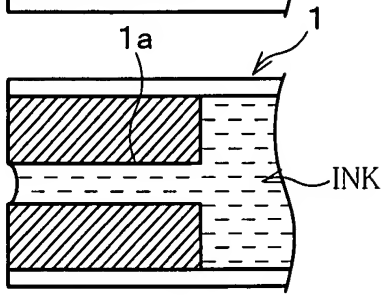


FIG. 22

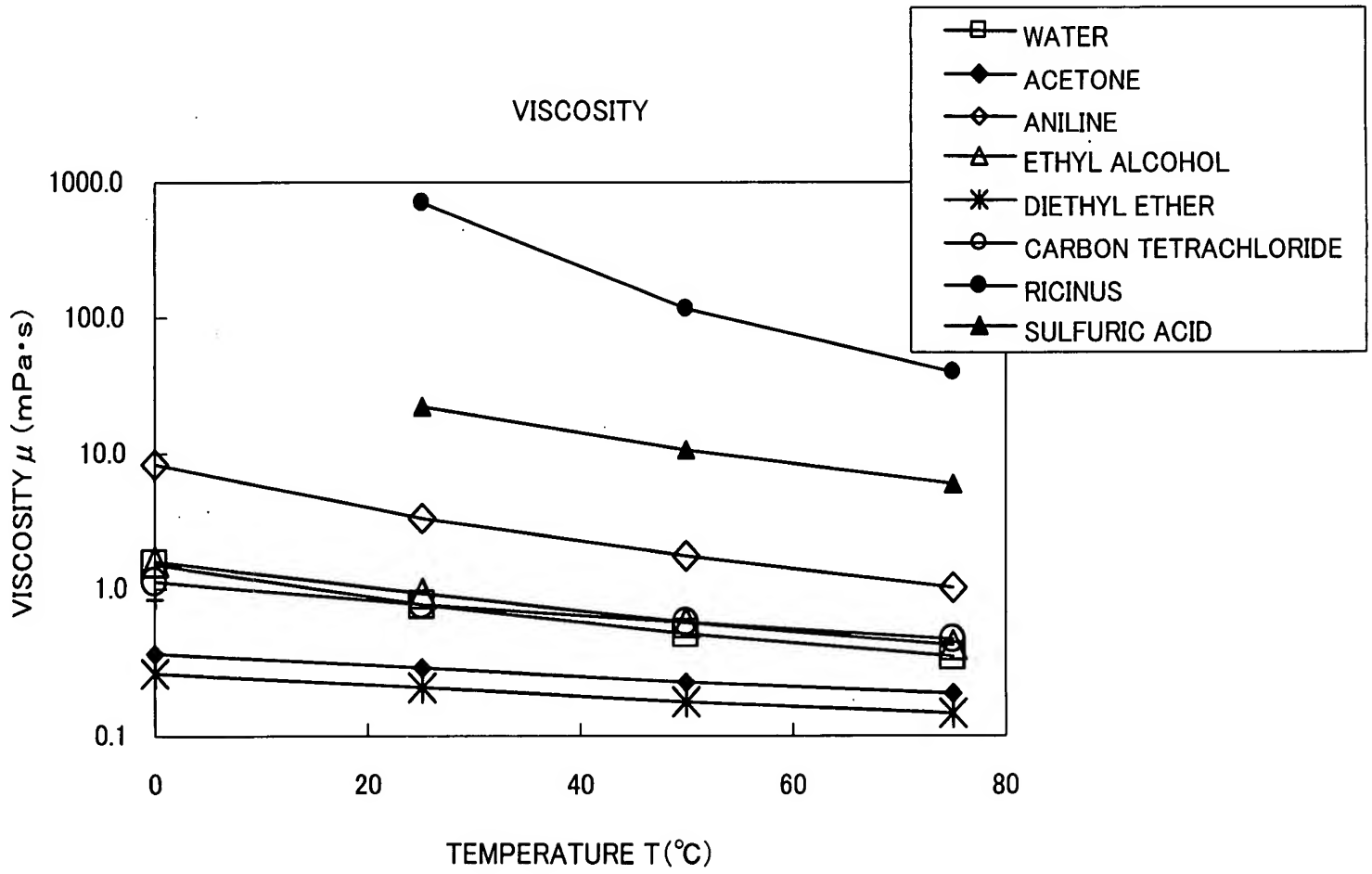

VISCOSITY
WATER
ACETONE
ANILINE
ETHYL ALCOHOL
DIETHYL ETHER
CARBON TETRACHLORIDE
RICINUS
SULFURIC ACID
1000.0
100.0
10.0
1.0
0.1
VISCOSITY μ (mPa·s)
0
20
40
60
80
TEMPERATURE T(℃)

FIG. 23

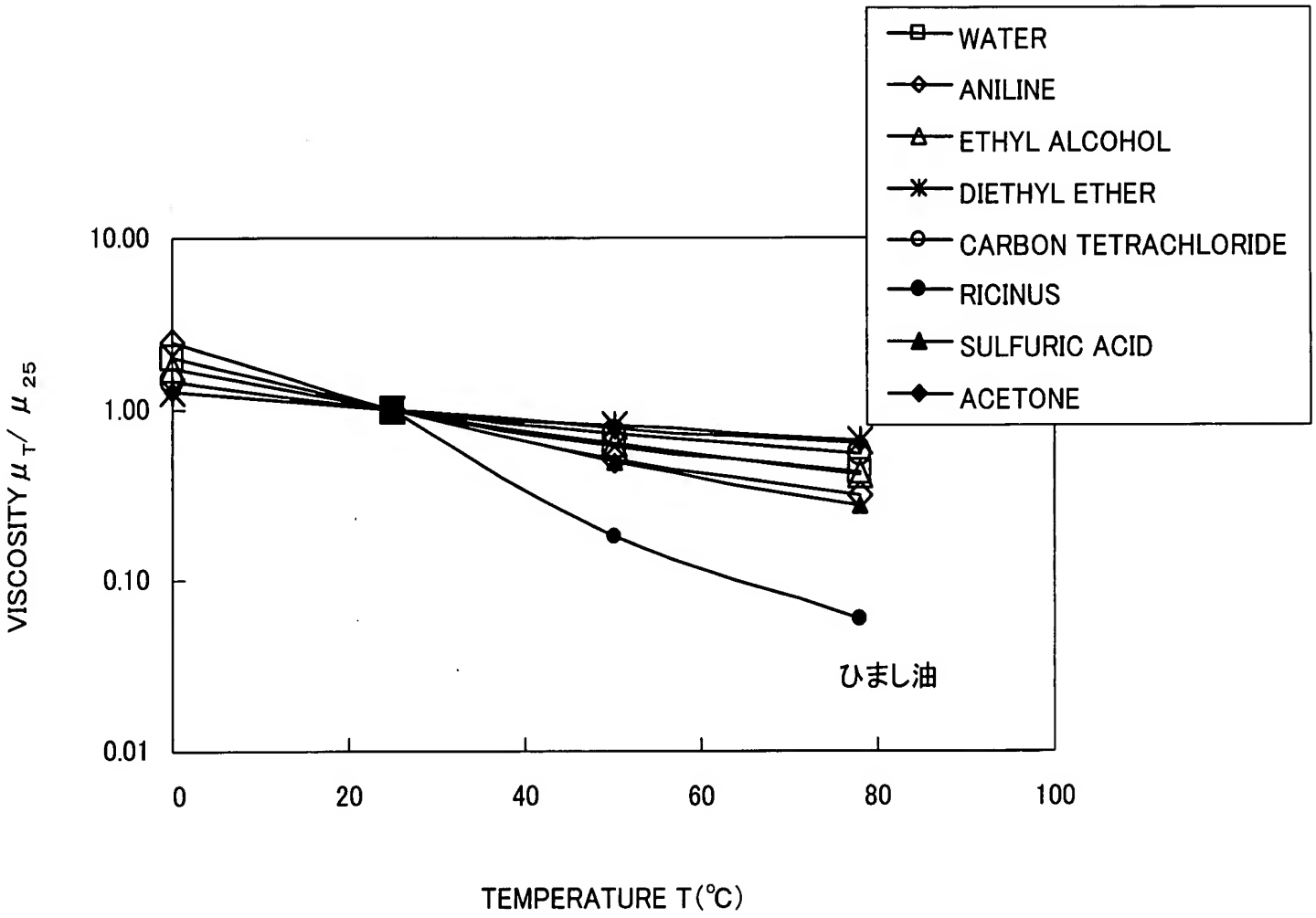

WATER
ANILINE
ETHYL ALCOHOL
DIETHYL ETHER
CARBON TETRACHLORIDE
RICINUS
SULFURIC ACID
ACETONE
10.00
1.00
0.10
0.01
VISCOSITY μ_T / μ_{25}
0
20
40
60
80
100
ひまし油
TEMPERATURE T(℃)

FIG. 24

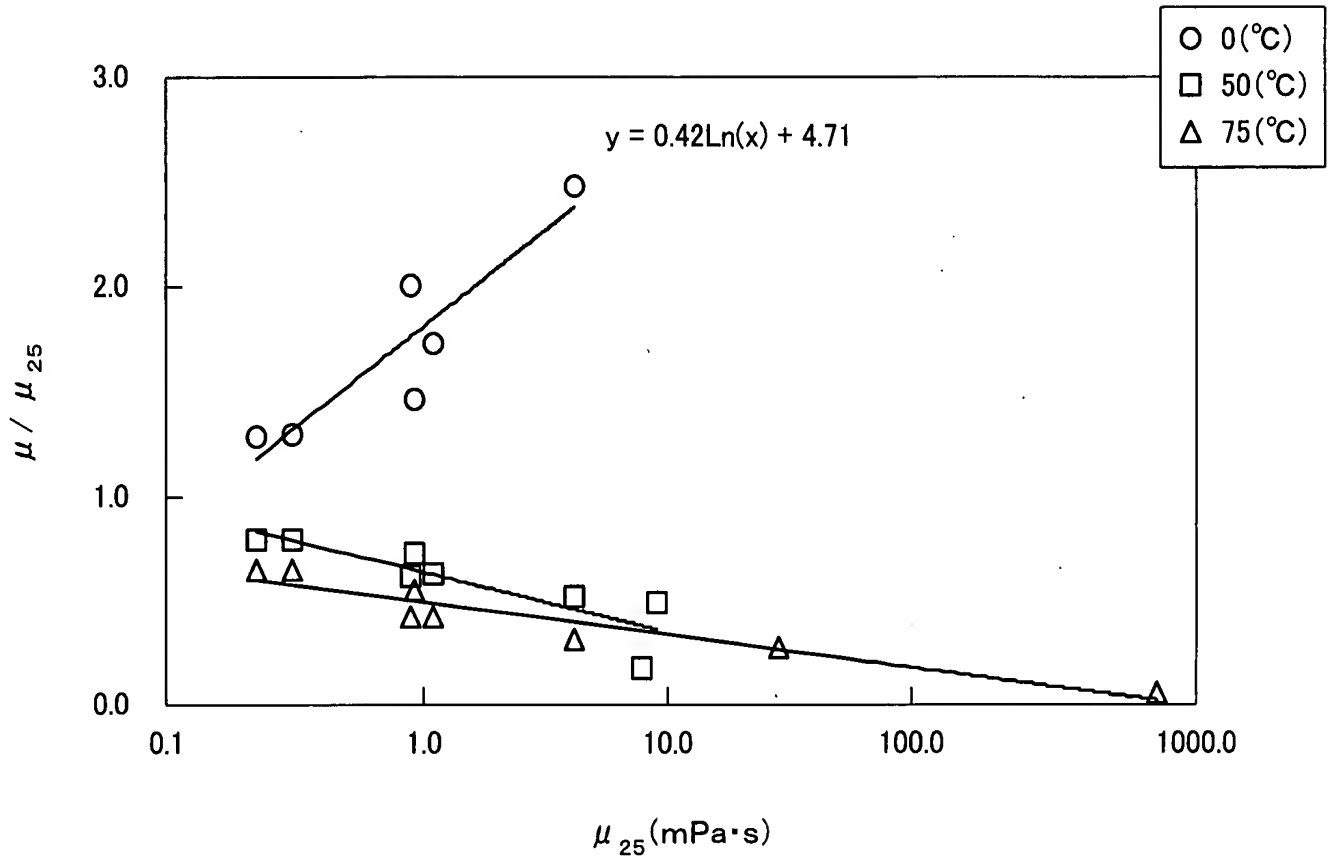

O 0(℃)
□ 50(℃)
△ 75(℃)
y = 0.42Ln(x) + 4.71
3.0
2.0
1.0
0.0
μ / μ25
0.1
1.0
10.0
100.0
1000.0
μ25(mPa·s)

FIG. 25

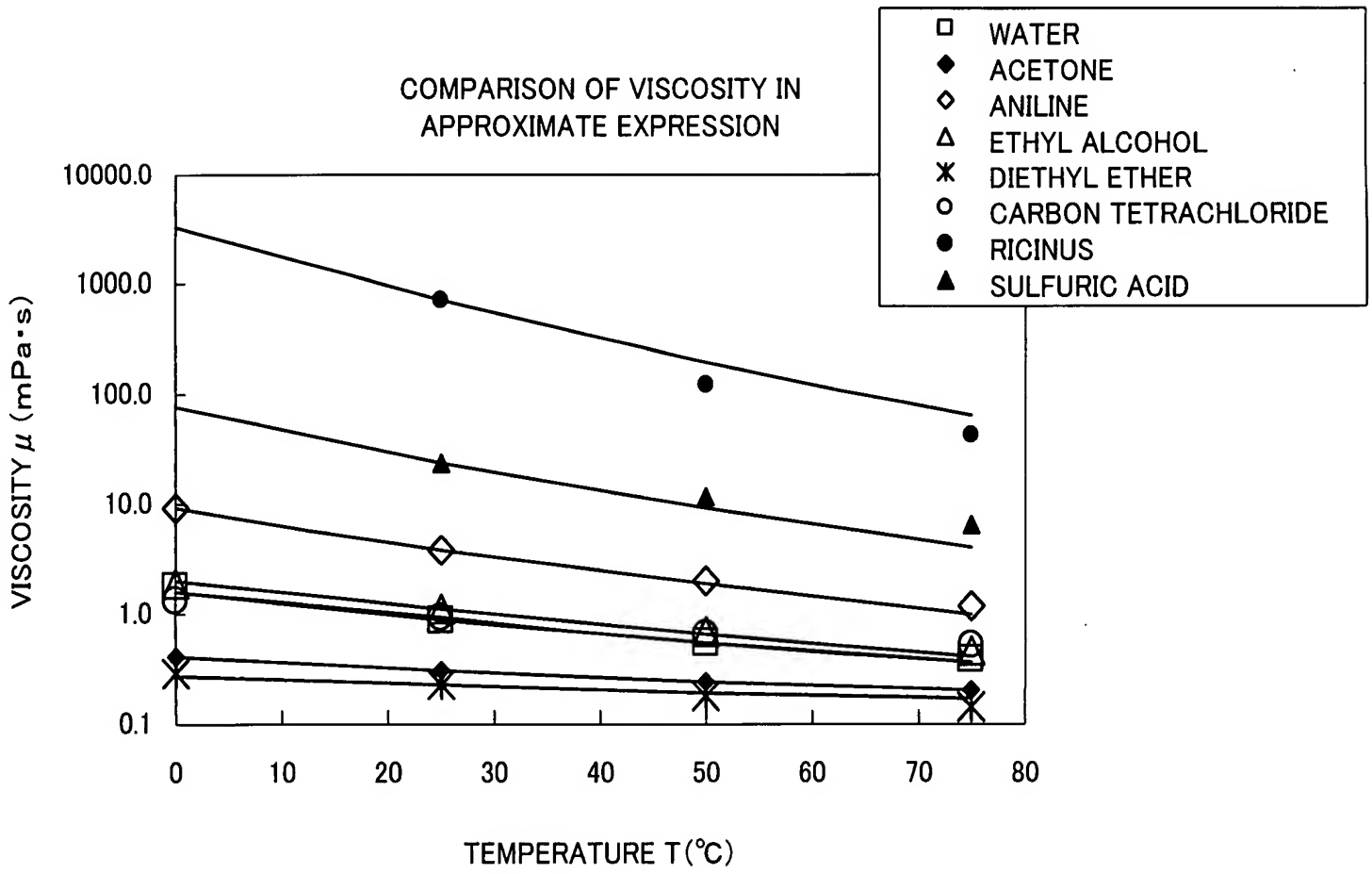

COMPARISON OF VISCOSITY IN APPROXIMATE EXPRESSION
WATER
ACETONE
ANILINE
ETHYL ALCOHOL
DIETHYL ETHER
CARBON TETRACHLORIDE
RICINUS
SULFURIC ACID
VISCOSITY μ (mPa·s)
10000.0
1000.0
100.0
10.0
1.0
0.1
0
10
20
30
40
50
60
70
80
TEMPERATURE T(℃)

FIG. 26

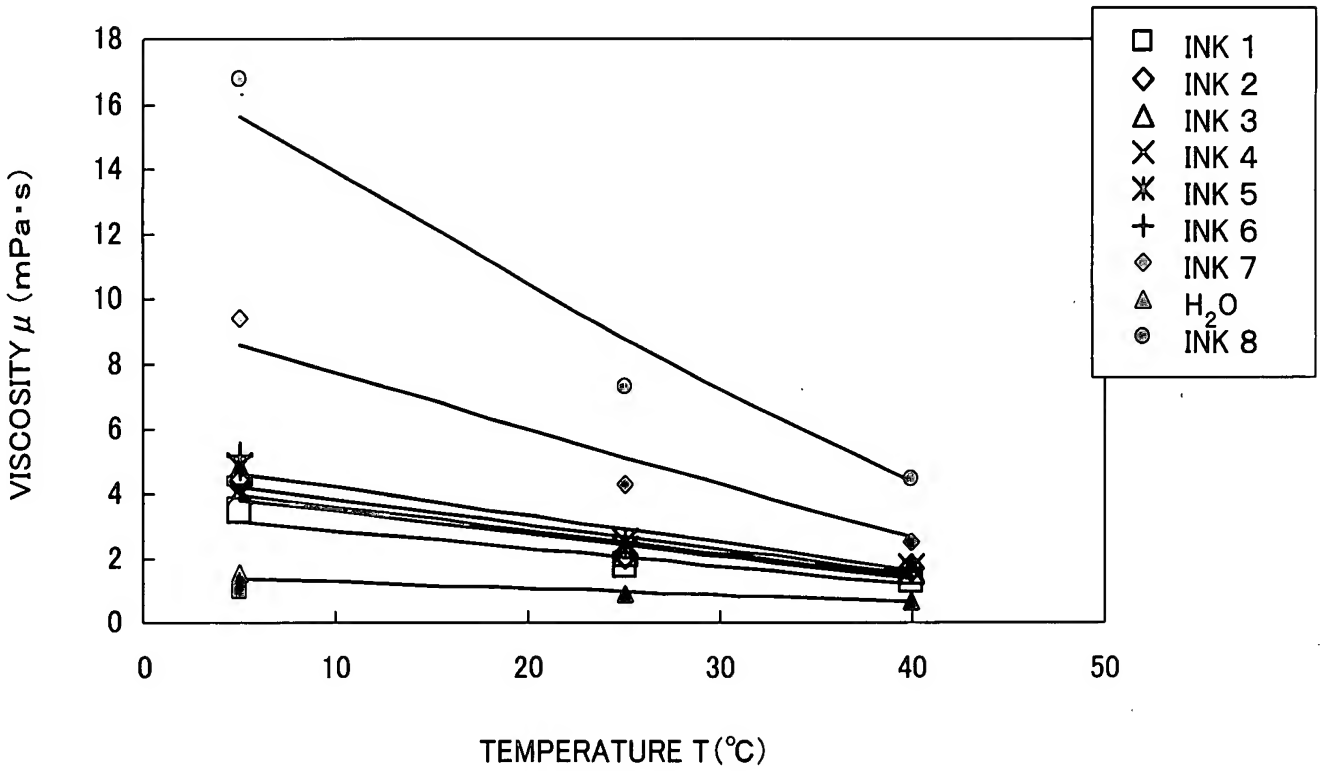
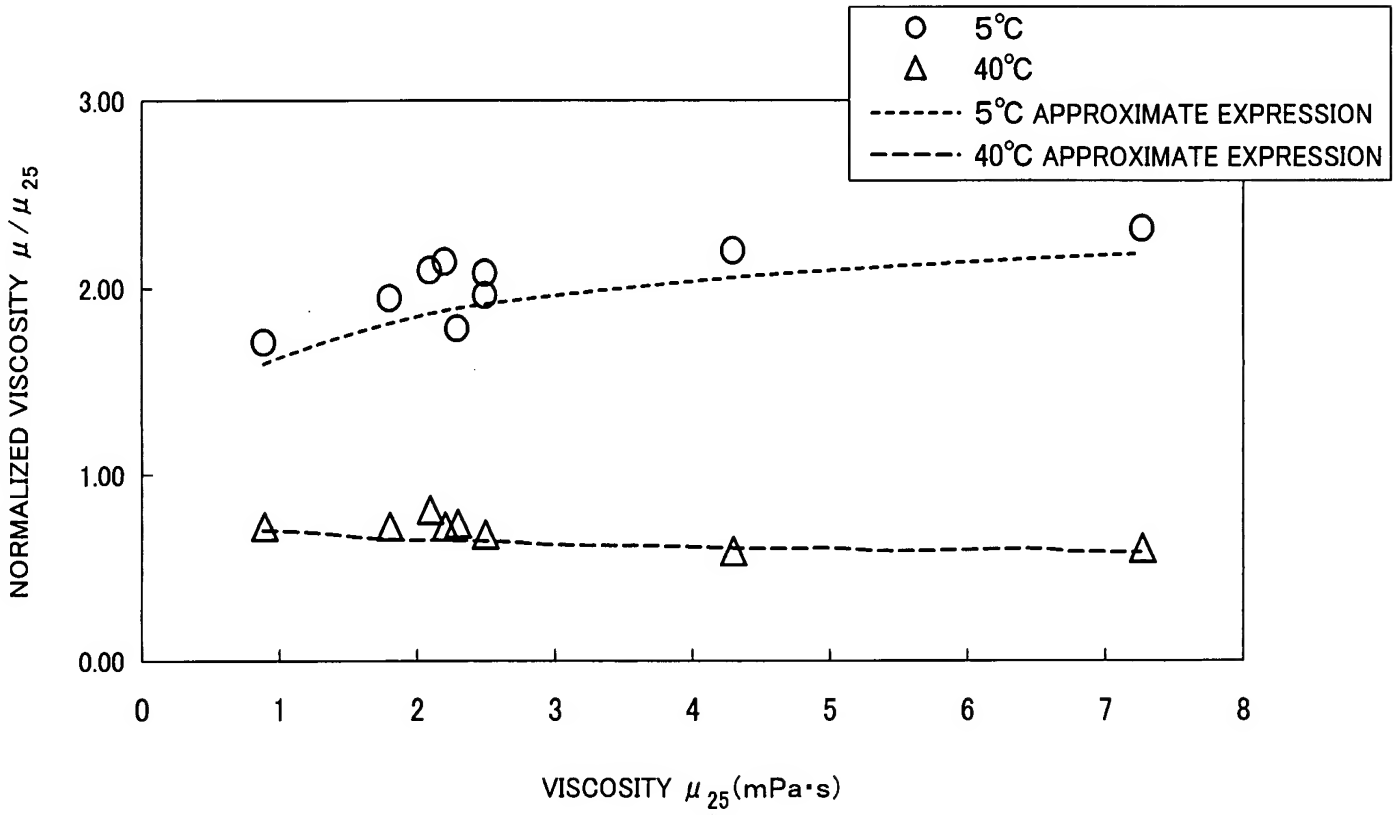

VISCOSITY μ (mPa·s)
18
16
14
12
10
8
6
4
2
0
0
10
20
30
40
50
TEMPERATURE T(°C)
INK 1
INK 2
INK 3
INK 4
INK 5
INK 6
INK 7
H2O
INK 8

FIG. 27


5℃
40℃
5℃ APPROXIMATE EXPRESSION
40℃ APPROXIMATE EXPRESSION
NORMALIZED VISCOSITY μ / μ25
3.00
2.00
1.00
0.00
0
1
2
3
4
5
6
7
8
VISCOSITY μ25(mPa·s)